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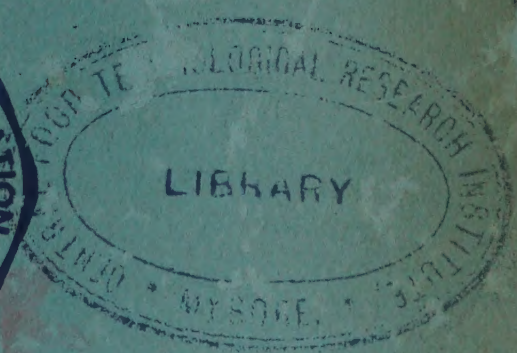
Procedure for The Investigation of Foodborne Disease Outbreaks



Recommended by

THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS

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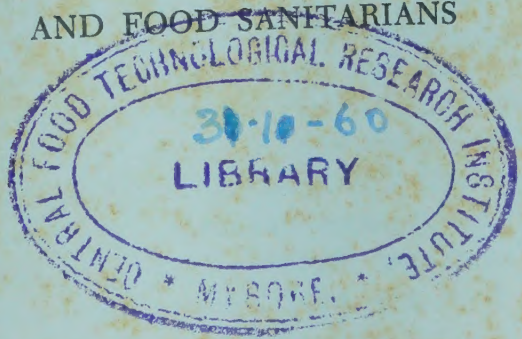
PROCEDURE FOR THE INVESTIGATION OF FOODBORNE DISEASE OUTBREAKS

Prepared by the

COMMITTEE ON COMMUNICABLE DISEASES AFFECTING MAN

of the

INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS



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International Association of Milk and Food Sanitarians, Inc.

Shelbyville, Indiana

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FOREWORD

This outline has been designed as an aid to public-health workers who find it necessary to investigate a reported outbreak of foodborne disease. It is not intended to supplant the health officer or trained epidemiologist. Its purpose, rather, is to assist them in epidemiological investigations where foods may be involved, by suggesting to other public-health personnel who may be called upon to assist, procedures which will assure proper collection and preservation of relevant data, samples, and exhibits.

U. S. Public Health Service records indicate that many outbreaks of foodborne diseases cannot be included in its official summaries because the reported data are incomplete. Such outbreaks are often not investigated because of a lack of trained, "on-the-spot" personnel. It is hoped that this outline will be of material assistance to health officers, epidemiologists, veterinarians, sanitarians, and other public-health workers in their investigations of outbreaks of foodborne disease.

For these reasons, the scope of the outline is limited to those matters which require prompt action, such as locating and interviewing exposed individuals, securing menu data and samples of leftover foods, preserving, identifying, and submitting proper samples to the laboratory, etc. In addition, public-health workers who do not have available the services of a trained epidemiologist will find herein guidance which may enable them to attempt a complete investigation and analysis of an outbreak of foodborne disease. The term "foodborne disease", as used in this manual, includes diseases originating from any solid food, or from milk, water or other beverage.

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INTRODUCTION

Milk and food sanitation continues to be one of the major public-health programs of state and local health departments. It is a program which benefits practically everyone by preventing possible illness which may result from the consumption of contaminated milk, food and water in the home, at public gatherings and in commercial establishments. All foods, including beverages, are subject to contamination by micro-organisms, parasites and toxic substances, and certain foods support bacterial growth. Therefore, illnesses, ranging from slight discomfort to death, may result when such foods are not adequately protected from contamination, or are stored at temperatures favorable to bacterial growth.

Because of the importance of epidemiological investigations of outbreaks of illness in milk and food sanitation programs, and because some states and many municipalities do not have epidemiologists, a manual of procedures for the epidemiological investigation of outbreaks of foodborne disease has been developed by the Committee on Communicable Diseases Affecting Man, International Association of Milk and Food Sanitarians, Inc. In the preparation of this manual, the Committee recognizes and wishes to emphasize the fact that the investigation of outbreaks of foodborne disease calls for cooperative teamwork with the epidemiologists by the health officer, practicing physicians, nurses, veterinarians, sanitarians, sanitary engineers, laboratory technicians, and statisticians.

The principal objectives in undertaking this project were:

(1) To provide public-health workers with a suggested procedure for guidance when confronted with an outbreak of disease which may be attributed to milk, food, or water.

(2) To prevent future outbreaks, through application of knowledge gained as a result of complete and thorough epidemiological investigations.

(3) To stimulate an active interest on the part of public-health workers in the epidemiological aspects of their programs.

(4) To improve reporting of foodborne disease.

This procedure is not intended to replace or conflict with procedures or instructions already issued by state or local health departments. Before using this outline, public-health workers should determine if such a procedure is provided by their state or local health department. If written guidance is available, they should familiarize themselves with it and follow its instructions.

Although many public-health workers may not have had sufficient specialized training and experience to carry out a complete epidemiological study, they may be compelled under certain circumstances to play a leading role in the investigation of outbreaks of foodborne disease. With this in mind, the manual includes suggested procedures for (1) conducting the investigation of a suspected outbreak, (2) collecting and handling food samples for laboratory examination, and (3) collecting and handling specimens of feces and vomitus for laboratory examination. Included, also, are suggested report forms, a detailed classification of illness attributed to milk, food and water, and a list of publications to which the public-health worker may refer for further information.

Foodborne diseases should be thoroughly investigated and promptly reported to local and state health officers who, in turn, should report them to the National Office of Vital Statistics, U. S. Public Health Service, Washington, D. C. Thorough investigation and correction of faulty procedures may prevent further spread of the outbreak, and may provide vital information in the event of biologic warfare. Dissemination of the information obtained in an investigation of an outbreak may serve as a warning of possible occurrence elsewhere or possible spread from one area to another.

ACKNOWLEDGMENTS

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The section on "Procedure for the Investigation of Foodborne Disease" (PART I) is based on similar material developed by the Division of Food and Drugs, Indiana State Board of Health, Indianapolis, Ind. The section on "Identification of Human Sources of Contamination" (PART III) is based on an article entitled "The Investigation of Foodborne Outbreaks of Acute Gastroenteritis", by Dr. Milton Feig (*Am. J. Pub. Health,* 12:1535-1541. 1952). The section on "Classification of Illnesses Attributable to Foods" (PART V) is based largely on information contained in (a) the book *Food Poisoning,* by Dr. G. M. Dack (Rev. ed., University of Chicago Press, Chicago, Ill. 1949); (b) the article on "Illnesses Attributed to Foods", by Mr. Ferdinard A. Korff (*Modern Sanitation,* 4:25-26. June 1952); and (c) material furnished by the Epidemiology Branch, Communicable Disease Center, U. S. Public Health Service, Atlanta, Ga.

— The Committee on Communicable Diseases Affecting Man, International Association of Milk and Food Sanitarians, Inc.

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Part I. Procedure for the Investigation of Foodborne Disease

No two outbreaks of foodborne disease are exactly the same. The etiology of the illness often will be difficult to ascertain, and the investigator may become frustrated. Sufficiently detailed instructions cannot be given which will apply in every instance; however, there are certain fundamentals which, if followed, should result in a successful investigation. These fundamentals are discussed below.

The purpose of an investigation is to determine the circumstances leading to the outbreak, and to supply information that may be used to prevent a recurrence. It must be remembered that an investigator often has but one opportunity to collect the facts which may point to the cause of the outbreak. Ordinarily, it is not practicable to return several times over a period of days to obtain information which could have been collected earlier. The persons involved may become scattered, or may forget pertinent facts. The food involved may be consumed or discarded. Therefore, it is imperative that all the facts be collected and studied as soon as possible after the outbreak occurs. With these thoughts in mind, the following suggestions are made:

1. Visit and question all persons known to be, or suspected of having been, present at the time the questionable meal was eaten. (If a very large number of persons became ill, only a statistically significant number of such persons need to be visited). This would include those who prepared, served, or ate the meal. During these interviews, fill out Form A "Case History Questionnaire" as completely as possible, using a separate form for each person interviewed. Do not suggest answers to the questions, but permit the patient or person to answer the questions to the best of his ability. All the different types of foods eaten by the persons involved over a period of 48 hours preceding onset of symptoms should be listed, if possible. It should be kept in mind, however, that in the case of typhoid fever and some parasitic infections the onset of symptoms may occur 7 to 21 days following the time the offending food was consumed.

2. If patients to be visited are hospitalized, or are being treated by a physician, obtain directly from the physician or hospital personnel information relative to symptoms, available laboratory findings, diagnosis, and treatment, and include such information on Form A, or directly on summary Form B.

3. Visit the establishment or establishments where the suspected meal, meals, or drinks were prepared and consumed, and make a complete inspection. As a part of this inspection, (a) secure a copy of the menu for

the day or meals; (b) inquire from the cook, proprietor, and others as to the source and method of preparation of each item of food shown on menu; (c) inquire as to the method of storage (including temperature and length of time at which the food was stored) of all perishable foods – poultry, meats, salad dressings, broths, dairy products, etc. – before and after cooking; (d) determine where the establishment purchased various foods served at the suspected meal, (i. e., the retailer, wholesaler, distributor, canner processor, manufacturer, or producer); (e) make inquires regarding the health of food-service employees in the establishment[1]; (f) obtain the assistance of the health officer or a physician to determine the cause, if food-service employees have been away from work because of recent illness; (g) note any employees who have infections on hands or other exposed surfaces of their bodies; (h) make a complete sanitary inspection of the establishment, including a determination for toxic metals, such as cadmium, antimony, zinc, and copper in the equipment, and the presence of poisonous pesticides and cleaning agents on the premises (if such substances are found, investigate the possibility of their having contaminated food); and (i) if there is evidence of the presence of insects or rodents, determine whether or not they have had access to the food involved. These findings should be recorded on Form C "Food Preparation and Sanitation Report."

4. Samples of all perishable leftover foods served at the suspected meal or meals, including water samples, should be taken aseptically and kept under refrigeration. The procedure for collecting these samples, as outlined in Part III of this manual, should be followed, and Form D "Sample Collection Report" should be completed. Keep in mind that any samples obtained can be used only to corroborate epidemiological findings.

5. Correlate on Form B "Summary of Case Histories" the information obtained from patients and others interviewed and from the place where the suspected meal was served.

If the information obtained is completely accurate, the responsible food or foods probably will be found to have been consumed by all of those who became ill; however, errors of memory, especially if considerable time has elapsed between the meal and the interview, will cause a few persons who were ill to give a false negative history of consumption of the responsible food. On the other hand, the fact that one food was consumed by all persons who attended the meal is not conclusive evidence.

1A simple inquiry regarding the health of food-service employees is often not sufficient for the epidemiological investigation of certain enteric infections, such as typhoid fever and dysentery. Since organisms which cause foodborne disease may be found in respiratory and skin infections, physical examination of the employees including laboratory tests, may be indicated. It is important to remember that the food may have been merely the vehicle for dissemination of pathogenic microorganisms, the actual source being a carrier who can be identified only by stool, nose, or throat cultures.

It is necessary to determine also, how many of those *not* attacked ate each food item. For several reasons (variations in susceptibility, ingested dosages of toxin or bacteria, etc.), there may be some persons who have a history of eating the responsible food, but who did not become ill. The determination of which food was the offending one can be aided by a comparison of the percentage of persons who ate the food without becoming ill with the percentage of those who were ill. In making this comparison, a tabulation by food items, as shown in Table I would be helpful.

TABLE 1. Summary Tabulation of Morbidity Data

Food or beverage	Group A Persons who ate specified foods				Group B Persons who did not eat specified foods			
	Ill	Not ill	Total	Attack rate per cent	Ill	Not ill	Total	Attack rate per cent
Baked ham	29	17	46	63	17	12	29	59
Spinach	26	17	43	60	20	12	32	62
Mashed potato	23	14	37	62	23	14	37	62
Cabbage salad	18	10	28	64	28	19	47	60
Jello	16	7	23	70	30	22	52	58
Rolls	21	16	37	57	25	13	38	66
Brown bread	18	9	27	67	28	20	48	58
Milk	2	2	4	50	44	27	71	62
Coffee	19	12	31	61	27	17	44	61
Water	13	11	24	54	33	18	51	65
Cakes	27	13	40	67	19	16	35	54
Ice cream (van.)	43	11	54	80	3	18	21	14
Ice cream (choc.)	25	22	47	53	20	7	27	74
Fruit salad	4	2	6	67	42	27	69	61

The results of this comparison should be recorded at the bottom of Form B. The responsible food should have a very high attack rate in Group A and a much lower attack rate in Group B. For example: Table 1 shows that the attack rate for persons who ate vanilla ice cream (the offending food in the outbreak cited) was 80%, and the attack rate for persons who did not eat vanilla ice cream was 14%. If the data are complete and accurate, and if proper samples of the particular food have been secured and prepared according to directions, the laboratory analysis will quite likely confirm the findings.

It must be pointed out that, in preparing this summary, discrepancies in the statements made by various patients may occur, in which case it may be necessary to interview some of the patients a second time. Too much dependence should not be placed on the results of analysis of samples submitted.

Included as Part V of this manual is a list of diseases which may be foodborne, the causative agents, signs and symptoms, and foods which may be implicated in such outbreaks. This is a fairly complete list, and includes the organisms of chemicals usually involved in past food-poisoning outbreaks. A comparison of the signs and symptoms among the patients, and the incubation period, may suggest the cause of the outbreak.

Epidemiological study of an outbreak often will give a rather definite clue as to the causative agent, thus reducing the amount of laboratory study which would be indicated. In some outbreaks the epidemiological evidence will be sufficiently complete to indicate fairly conclusively the agent involved. For example, if a preliminary investigation of the outbreak shows an onset of less than 1 hour, a metallic poison or toxic alkaloid probably would be involved. If the onset is 3 to 6 hours, a staphylococcus intoxication may be involved, and if 8 hours or more, an enteric infection can be expected. Wherever possible, the cause of the outbreak should be determined or confirmed by the health officer or an epidemiologist.

Occasionally, food-poisoning outbreaks result in civil suits for damages. Therefore, the investigator should keep in mind the need for accuracy in determining the cause of the outbreak. Contaminated food served in a public eating establishment may result in illness ranging from only 2 or 3 cases to hundreds of cases, depending on the extent of contamination of the food and the number of persons eating the food involved. When an establishment has served multiple portions of a given food and only one person has become ill, it is questionable that the food caused the illness. Similarly, when commercially prepared food is suspected as being the cause of one case of reported illness in the home, whereas many hundreds of units of the same food have been distributed, it is questionable that the food itself, as received in the home, was the cause of the illness. In the latter case, it is more likely that the food was contaminated in the home after it was removed from the container, or that some other condition was responsible.

When reliable information indicates that a commercially prepared food is the cause of illness, data must be obtained immediately as to the source of this food, where it was purchased, and any identifying codes or marks on the containers. The information should be promptly forwarded for appropriate action, to the state health department and any other regulatory agency having jurisdiction. The U. S. Food and Drug Administration should be notified immediately if the food known or suspected of causing the illness is processed for interstate shipment.

If a trained epidemiologist from either the local or state health department is available, he should conduct the investigation of a foodborne disease outbreak. However, public-health workers in the municipality or county

where an outbreak occurs usually have the first opportunity to obtain data and collect samples of leftover foods; therefore, the initial part of the investigation should be pursued by the local official as quickly as possible, even though awaiting arrival of an epidemiologist.

The following outline developed by Dr. Sartwell of Johns Hopkins University summarizes the basic considerations in investigating any disease outbreak suspected of being spread by a common agent. Since it is applicable to foodborne outbreaks, it is included as additional reference material.

Investigation of an Outbreak Suspected of Being Spread by a Common Vehicle as Illustrative of Epidemiologic Studies

(NOTE: Obviously, no general outline can be applied to all diseases, or to all circumstances. The following is merely a general guide, which must be adapted to each situation. The marginal headings are intended to indicate the parallelism of this outline with the stages of scientific investigation in some other field).

Objective

1. A clear recognition of the problem or purpose of investigation.

---

2. Verification of diagnosis — essential.
3. Verification of the existence of an epidemic by comparing with adequate previous experience.
4. Identification of the event constituting common exposure.

Materials and Methods

5. Delineation of the group involved.
6. Individual epidemiologic histories, to permit classification of all exposed persons as to:—
   a. Exposure to specific potential vehicles.
   b. Whether or not ill (inapparent infections may also need to be searched for).
   c. If ill, clinical data adequate to substantiate diagnosis; time of onset; pertinent bacteriologic findings.
7. Investigation of source and method of preparation and preservation of suspected foods.
8. (Collateral) Study of environmental conditions, e.g., sanitary status of restaurant, or of water or milk supply; examination of food residues.
9. Search for human or animal source of infection.

Analysis of Findings

10. Distribution in time (epidemic curve).
11. Geographic distribution.
12. Selection for age, sex, race or other pertinent characteristics, by comparative attack rates.
13. Attack rates for those exposed, and those not exposed, to each suspected vehicle (alternatively, association with the vehicle may be shown by comparing frequency of exposure to the suspected vehicle among those attacked and those not attacked.)

Results

14. Development of hypothesis, with evidence pro and con; consideration of alternative possibilities. Type of epidemic — vehicle — source of infection — method of contamination, etc.

Conclusions

15. Summary as to the disease, its epidemiologic features, the vehicle and how, when and where it became infected.

Recommendations

16. Administrative action to be taken to reduce possibility of such occurrences, including educational measures.

Part II. Procedure for Collecting and Submitting Food Samples for Laboratory Examination

Often, samples of food suspected of causing outbreaks of foodborne disease are received in nonsterile containers wrapped in newspaper or other unsuitable coverings, and are not refrigerated. Consequently, they are partly or wholly decomposed. They are received, also, with no identification other than the sender's name, and with no information other than a statement that the food had caused such an outbreak.

Foodborne outbreaks are frequently the subject of court proceedings, and the laboratory personnel are called upon to testify as to their analysis of the food. Obviously, such testimony is of little or no value when the record of the sample is incomplete, and laboratory results are of no significance if the sample is received in a nonsterile container or in a state of decomposition. Therefore, the following procedures should be followed:

1. Aseptic technique must be followed in preparing the sample. Knives, spatulas, or other instruments, when used to obtain a sample, must have been previously sterilized in an open flame or by using one of the methods described in (2). Foods in small, closed or covered containers should not be removed from the container, but should be sampled in their entirety.

2. Bulk samples must be placed in sterile containers. Sterile water-sample bottles, which may be obtained from the local water company or state health department, are ideal for liquids, semisolids, or shredded material. A wide-mouth jar or lard pail with a tight-fitting lid may be used for large samples, provided it is thoroughly cleaned and sterilized. A local hospital or laboratory may be able to furnish a sterile container, or to sterilize containers which are to be used. If containers are to be sterilized, it is recommended that steam under pressure — exposure at 121° C. (250° F.) under pressure of 15 pounds for 20 minutes — be used. If this method of sterilization is not possible, dry heat at 160° C. (320° F.) for 4 hours, or boiling water — complete immersion for 30 minutes — may be used. A statement of the method used to sterilize the container must appear on the sample collection form.

3. The sample must be properly identified. Proper identification would include the place and time the sample was collected, the method of collection if indicated, the reason it is being submitted for analysis, the organism or chemical suspected, and any other pertinent information.

4. The sample must be sealed. Gummed paper tape, surgical adhesive tape, or plain paper covered with cellophane tape may be used to seal the sample container. The date and time of sealing and the name of person who collected and sealed the sample should be written on the tape. The seal should be affixed to the inner food container in such a manner that the container cannot be opened without breaking the seal.

5. The sample should be accompanied by as much information as may be immediately available, such as (a) the number of persons who may have become ill, (b) the elapsed time between ingestion of the food and onset of symptoms, (c) the symptoms observed or reported, and (d) the reason for suspecting this food. An accurate statement of the symptoms experienced, particularly the incubation period, is especially valuable as a guide in the conduct of laboratory tests.

6. Perishable samples must be refrigerated from the time they are collected until they are received at the laboratory. Those not immediately sent to the laboratory for analysis should be retained under refrigeration for possible later study. All perishable samples should be refrigerated

until they are either sealed in their original containers or placed in sterile containers. The sealed sample container should be enclosed in an outer container (preferably insulated) with sufficient dry ice added to provide refrigeration during transit. Insulated dry ice containers may be purchased for a small sum from many locker plants and dry ice distributors. When samples must be sent to the laboratory by public conveyance or mail, it must be remembered that they may be delayed in transit. Therefore, sufficient refrigerant should be used so that some will be present when the sample is opened. (Refrigerant must not come in direct contact with the food sample). The container must be prominently labeled: "Perishable Food Sample for Bacteriological Examination – Rush," and should be sent by fastest possible means of transportation. Samples so labeled should receive immediate attention, regardless of time of arrival.

7. Since laboratory analyses of food samples require some preparatory work, it is important that the laboratory director be given advance notice, preferably by telephone or wire, of the number of types of samples being submitted.

Part III. Identification of Human Sources of Contamination

Regardless of the specific nature of the outbreak, all food handlers most closely associated with the suspect meal or foods should receive a medical examination by a physician. A well-taken history, with emphasis on recent acute illness and chronic digestive disturbances, as well as skin and respiratory disease, is essential. The physical examination should include observation of the skin, eyes, ears, nose, throat and the perianal region. The taking of nose and throat cultures and fecal specimens for bacterial culture from all food handlers involved in an outbreak must be routine. Subclinical infections of the respiratory tract may contaminate food with the enterotoxin-forming staphylococci. Should there be evidence of suppurative skin lesions, or of ear infections, cultures from these infected areas may be indicated. When bacteriological study of the contaminated food reveals the presence of *Salmonella* or *Shigella* organisms, at least three successive stool specimens should be taken from each food handler before such person is eliminated as a possible carrier. If a food handler had also partaken of the contaminated food at the suspect meal, a positive stool culture yielding the same organism would have no significance, other than to indicate another victim, unless the food handler gives a definite history of gastrointestinal disturbance prior to the outbreak.

In outbreaks with relatively long incubation periods, the possible etiology of *Salmonella* and *Shigella* groups enters into consideration, and laboratory examination of stool specimens from ill persons who ate the suspect meal would be indicated. In outbreaks of short periods of onset, as with metallic poisoning or staphylococcus intoxication, laboratory examination of the vomitus may be indicated. The chain of transmission is completed when the same species of organism is isolated from the human or animal carrier, the vehicle, and the patients' stools. It is not to be expected that successful isolation will be achieved in all patients, therefore, fecal samples from a representative number of patients must be submitted for study. For adequate species identification, it may be necessary to forward the cultures to laboratory centers having Salmonella typing facilities.

Because of the difficulty of isolating *Shigella* organisms from patients' stools, it is of the utmost importance that fecal specimens be procured from patients as early as possible in their illness. It is desirable that more than a single specimen be obtained, and that specimens from an adequate number of patients be obtained. Multiple fecal specimens must be obtained from food handlers before they can be eliminated as possible carriers. Should the *Shigella* groups isolated from patients, food, and carrier or other source be the same, typing of the organism would then be indicated.

It is as important to refrigerate, or otherwise preserve, stool specimens as it is to refrigerate food. If specimens are to be shipped and if acceptable to the laboratory to which the samples are to be sent, buffered glycerol-saline preservative may be used as an alternative to refrigeration.

Part IV. Report Forms

Forms A, B, C, and D, appearing on pages 16-20, are samples of forms which may be used in conducting an investigation of a suspected foodborne disease outbreak. They may be reproduced as needed and modified to meet local conditions and state requirements.

FORM A

Case History Questionnaire

City	State

Name of Person	Address

Occupation	Age	Sex	Telephone No.

Did individual partake of the suspected meal? ☐ yes ☐ no
If yes, date and hour food eaten:
Did individual become ill? ☐ yes ☐ no
If yes, date and hour of onset:
Below is a list of foods and beverages served at the suspect meal (check only those which were eaten).

Food Item		Food Item		Food Item	

Which of the following symptoms did individual have, and how long (in hours) did they last?

Nausea or Vomiting ..... Diarrhea ..... Fever .....

Prostration ..... Paralysis ..... Other .....

Was a physician consulted? ☐ yes ☐ no Diagnosis:

If yes, physician's name and address:

Name of hospital, if hospitalized:

Names of other persons who partook of the suspect meal:

....
Date

.....
Investigator

FORM B

Summary of Case Histories

LOCATION OF OUTBREAK (*Name and Address of Establishment*) | DATE OF OUTBREAK

Names of persons (sick or well) who ate suspected food or drink	Age	Ill (yes or no)	Required medical aid (yes or no)	Date and hour food eaten	Date and hour of onset	Food served at suspected meal (Check foods eaten)								Symptoms					
														Nausea or Vomiting	Diarrhea	Fever	Prostration	Paralysis	Other

SUSPECTED FOOD OR FOODS (*Include origin of each food item*):

DATE OF REPORT:..... INVESTIGATOR: .....

FORM C

Food Preparation and Sanitation Report
(Foodborne Disease Outbreak)

1. Outbreak at (*Name and Address of establishment*)			Date of outbreak	Time of suspected meal
Day and Hour of onset	**First case**	**Last case**	**Number persons exposed**	**Number persons ill**

2. Food history

Food item	Source	Preparation of item			Storage and Refrigeration	Results of laboratory examinations
		When?	Where?	By Whom?		

3. Canned foods (If commercially prepared, identify manufacturer, brand and lot number. If home canned, describe process used):

4. HISTORY OF FOOD HANDLERS:

Name	How long employed here?	Duties	History of recent illness	Laboratory examination

5. EPIDEMIOLOGIC CONCLUSIONS:

a. Suspected (or confirmed) food items:
b. Causative Agent:
c. How was food contaminated:

Date investigation begun	Date of this report	Name(s) of Investigator(s)

NOTE: Completed regular inspection form and narrative report should be attached.

FORM D

Sample Collection Report

DATE	CITY	SAMPLE NUMBER

Description of sample and source:

Identifying marks on seal (e.g., code or lot number)

Name of person from whom sample collected

Name and address of establishment where collected

Name of dealer, manufacturer, or processor, if known

Analysis requested (chemical, bacterial, etc.)

Method of sterilizing container:

Method of sterilizing utensils used to collect samples

Other suspected foods:

Method of shipping sample (air, rail, etc.)

INVESTIGATOR .....

Laboratory results:

Date of laboratory report

Laboratory Investigator

Name and address of laboratory

Part V. Classification of Illnesses Attributable to Foods

A. FOOD INFECTIONS (Bacterial)

Illness	Causative Agent	Foods usually involved	Other modes of transmission	Incubation* period	Signs and Symptoms	Measures to prevent spread by food
1. Bacillary dysentery (Shigellosis)	Members of the genus *Shigella*	Moist prepared foods, milk or other dairy products, contaminated with excreta	Direct or indirect contact with case or carrier, or contaminated water	Usually 2-3 days; extremes, 12 hrs. to 7 days	Diarrhea, bloody stools; fever in severe cases	Strict personal cleanliness in food preparation; refrigeration of moist foods during storage periods; cooking of foods prior to serving; elimination of flies
2. Brucellosis (Undulant fever or Bang's disease)	*Brucella abortus, Brucella melitensis, Brucella suis*	Raw contaminated milk, dairy products made from raw contaminated milk	Contact with fresh tissues or discharges of infected animals	3-21 days; may be several months in some cases	Insidious onset, fever, chills, sweats, weakness, malaise, headache, muscle and joint pains, loss of weight	Eradication of brucellosis from livestock; pasteurization of milk and other dairy products
3. Diphtheria	*Corynebacterium diphtheriae*	Milk contaminated from human sources	Direct or indirect contact with case or carrier	Usually 3-5 days; extremes, 2-7 days	Insidious onset; inflamation of throat and nose	Pasteurization of milk; search for and isolation of carriers

* Incubation period refers to the interval of time between entrance of the causative agent into the body and the onset of symptoms.

A. Food Infections (Bacterial) . . . continued

Illness	Causative Agent	Foods usually involved	Other modes of transmission	Incubation period	Signs and Symptoms	Measures to prevent spread by food
4. Hemolytic streptococcal infections (scarlet fever or septic sore throat)	Certain strains of Beta hemolytic streptococci	Foods contaminated with nasal or oral discharges from case or carrier; milk from cows having udder infections caused by these organisms	Direct contact with case or carrier	Usually about 3 days; extremes, 1-7 days	Fever, sore throat; rash occasionally	Pasteurization of milk and other dairy products; excluding persons with known streptococcal infections from handling food; isolation of carrriers; prophylactic antibiotic treatment of contacts of known cases
5. Streptococcal food infection	Enterococcus group *S. fecalis* (Lancefield group D.), Pyogenic group *S. pyogenes* (Lancefield group A)	Food products contaminated with excreta. Foods contaminated by respiratory discharges of case or carrier	Contact with contaminated persons or fomites. Wound infection, or contact with discharges of infected wounds	2-18 hrs.	Nausea; sometimes vomiting, colicky pains, and diarrhea; usually milder than staphylococcal food poisoning	Cooking of food thoroughly; refrigeration of moist foods during storage periods

6. Salmonellosis a) Typhoid fever	*Salmonella typhosa*	Any milk, shellfish, or other food product contaminated with excreta from human case or carrier	Water polluted by human excreta	Usually 7-21 days; extremes, 3-38 days	Insidious onset with malaise, lack of appetite, headache, fever, diarrhea. In children, onset may simulate early pneumonia	Pasteurization of milk and other dairy products; certification of shellfish; chlorination of water; prohibit carriers from handling food; elimination of flies; examination of stools of food handlers who have history of having had typhoid fever
b) Paratyphoid A	S. *paratyphi* A	Same as for typhoid fever	Contact with unrecognized case or carrier	Usually a few days; extremes 1-10 days	Fever, malaise; may resemble mild typhoid	Same as typhoid fever
c) Other types	Members of the genus *Salmonella*, e.g., *S. typhimurium, newport, oranienburg, montevideo, newington, enteritidis, choleraesuis, pullorum,* and others, including Arizona group	Meat and poultry salads, eggs and egg products	Direct or indirect contact with human or animal carriers	Usually 12-24 hrs.; extremes, 5-72 hrs.	Abdominal pain, diarrhea, chills, fever, frequent vomiting, prostration	Cooking of food thoroughly; strict sanitation in food preparation; refrigeration of moist foods during storage periods; wash hands frequently; protect foods from animal excreta

A. Food Infections (Bacterial) . . . continued

Illness	Causative Agent	Foods usually involved	Other modes of transmission	Incubation period	Signs and Symptoms	Measures to prevent spread by food
7. Tuberculosis (extra pulmonary)	*Mycobacterium tuberculosis* (human and bovine types)	Raw contaminated milk or other contaminated dairy products	Contact with infected animals and humans	Variable	Depends upon part of body affected	Eradication of tuberculosis from cattle; pasteurization of milk and other dairy products
8. Tularemia	*Pasteurella tularensis*	Meat of wild rabbits, squirrels, and similar animals	Dressing or handling infected animals, and bites of infected ticks and deer flies	Usually about 3 days; extremes, 1-10 days	Sudden onset with headache, chills, body pains, vomiting and fever; swollen lymph glands	Use rubber gloves and be careful when handling wild rabbits and squirrels; cook the meat thoroughly; arthropod-suppressive measures

B. FOOD INTOXICATIONS (Bacterial)

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
1. Botulism	Toxins	Home-processed foods; contaminated canned foods with pH over 3.5	Usually 12-36 hrs.; extremes, 2 hrs. to 6 days	Dizziness; lassitude; double vision; loss of reflex to light; muscular weakness; difficulty in swallowing, speech, and respiration; frequently fatal	Cook foods thoroughly before serving (boil 15 min. with stirring to insure heating of all parts, or pressure cook)
2. Staphylococcal food poisoning (intoxication)	Enterotoxin-producing staphylococcus (preformed enterotoxin)	Cooked ham or other meats; cream-filled or custard pastries, and other dairy products; bread puddings; potato salad, and other salads of protein foods; Hollandaise sauce; "warmed over" foods	Usually 2-6 hrs.; extremes, 1-11 hrs.	Nausea, vomiting, diarrhea, and acute prostration; abdominal cramps	Exclude from food handling, persons with nasal discharges or purulent local skin infections; cook foods thoroughly; refrigerate moist foods during storage; reheat custard pastries; wash hands frequently
3. *C. welchii* poisoning	*Clostridium welchii* (Type A)	Meat which has been boiled, steamed, braised, stewed, or insufficiently roasted and allowed to cool slowly and served the next day, either cold or reheated	8-22 hours	Acute abdominal pain and diarrhea; nausea and vomiting rare; fever, shivering, and headache seldom seen	Exclude from food handling, known carriers; cook meat immediately before consumption, or rapid cooking and refrigerate between cooking and use

C. PARASITIC INFECTIONS (Nonbacterial)

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
1. Amebic dysentery (Amebiasis)	*Endamoeba histolytica*	Water contaminated with sewage; moist food contaminated with human feces	Several days to 4 weeks	Diarrhea of varying severity; fatalities not uncommon	Protect water supplies; cleanliness in food preparation; insure proper disposal of human excreta
2. Beef tapeworm (Taeniasis saginata)	*Taenia saginata*	Raw or insufficiently cooked beef containing live larvae	Several weeks	Abdominal pain, hungry feeling, vague discomfort	Use meat processed under veterinary inspection; cook beef thoroughly
3. Fish tapeworm (Diphyllobothriasis)	*Diphyllobothrium latum*	Raw or insufficiently cooked fish containing live larvae	3 to 6 weeks	Usually none; anemia in heavy infections	Cook fish thoroughly. Avoid eating raw smoked fish
4. Pork tapeworm (Taeniasis solium)	*Taenia solium*	Raw or insufficiently cooked pork containing live larvae	Several weeks	Varies from a mild chronic, digestive disorder to severe malaise with encephalitis; may be fatal	Use meat processed under veterinary inspection; cook pork thoroughly

5. Trichinosis	*Trichinella spiralis*	Raw or insufficiently cooked pork and pork products, whale, seal, bear or walrus meat containing live larvae	Usually 9 days but may vary from 2 to 28 days. In heavy infections 24 hrs.	Nausea, vomiting, diarrhea, muscular pains, fever, labored breathing, swelling of eyelids; occasionally fatal	Cook pork and pork products thoroughly; freeze pork at 5° F. for 30 days, or at −10° F. for 20 days, or −20° F. for 12 days; cook garbage fed to swine; eliminate rats from hog lots

D. CHEMICALS

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
1. Antimony poisoning	Enamelware (gray) containing antimony	Any foods contaminated by leaching of container by acid foods	Few min. to hrs.	Vomiting, abdominal pains, spasms, collapse; occasionally fatal	Discontinue use of utensils with antimony in finish
2. Arsenic poisoning	Insecticides and rodenticides	Any foods accidentally contaminated	1 hr. or less	Vomiting, diarrhea; occasionally fatal	Use of colored pesticides and proper storage of same
3. Cadmium poisoning	Plating metal	Any food contaminated by leaching of containers and trays by acid foods including fruit juices	½ hr. or less	Nausea, vomiting, cramps; often fatal	Discontinue use of cadmium-plated utensils as food containers

D. Chemicals . . . Continued

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
4. Copper poisoning	Copper food-contact surfaces	Any acid food contaminated by leaching of copper surfaces by such food	1 hr. or less	Vomiting no specific symptoms	Prevent acid foods or liquids, or carbonated liquids from contact with exposed copper
5. Cyanide poisoning	Silver polish containing cyanide	Any food accidentally contaminated	½ to 6 hrs.	Nausea, vomiting, diarrhea, cold perspiration, exhaustion; often fatal	Discontinue use of cyanide silver polishes or exercise care in their use
6. Fluoride poisoning	Insecticides containing sodium fluoride	Any food accidentally contaminated	1 hr. or less	Vomiting, retching, cramps, pallor, collapse; often fatal	Discontinue use in food establishments of pesticides containing fluorides
7. Lead poisoning	Pesticides	Any foods accidentally contaminated	½ hr. or longer	Abdominal pains, vomiting; may be fatal	Use of colored pesticides and proper storage of same
8. Zinc poisoning	Galvanized ware	Any foods accidentally contaminated; leaching of galvanized containers by acid foods	1 hr. or less	Diarrhea, astringent taste	Education of persons preparing food

E. POISONOUS PLANTS AND ANIMALS

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
1. Castor bean poisoning	Ricin (a toxin in the castor bean)	Castor bean	Few minutes to several hours	Colic, thirst, vomiting, diarrhea, cold sweat, collapse	Avoid eating castor beans
2. Ergotism	Parasitic fungus of rye (*Claviceps purpurea*)	Rye meal or bread	Gradual, usually after several meals of diseased rye in meal or bread	Gangrene involving limbs, especially fingers, toes, occasionally ears and nose; convulsive depression, weakness and drowsiness, headache, giddiness, painful cramps in limbs and itching of skin	Use only rye products made from rye that is free of the parasitic fungus
3. Favism	Bean (*Vicia fava*) or inhalation of pollen from blossoming plant	The bean, *Vicia fava*	Few minutes to several hours	Dizziness and collapse; headache, malaise, nausea, yawning, vomiting, chills, pallor	Education of persons preparing food

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E. Poisonous Plants and Animals . . . Continued

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
4. Mushroom poisoning	Toxins (phalloidine and other alkaloids) of certain species of mushrooms	Poisonous mushrooms (usually *Amanita phalloides* and *A. muscaria*).	15 minutes to 15 hours	Salivation; sudden severe abdominal pain; intense thirst; nausea, retching; vomiting; profuse watery stools; excessive perspiration; a flow of tears; often fatal	Eat only mushrooms known to be of non-poisonous species; education of persons preparing food
Rhubarb leaf poisoning	Oxalic acid	Rhubarb leaves	2-12 hrs.	Diarrhea, vomiting, thirst	Education of persons preparing food
6. Selenium poisoning	Selenium	Milk, eggs, meat, vegetables, and cereal grains produced in seleniferous regions	Unknown	Dermatitis, skin rash, fatigue, dizziness, sleepiness, depression, dullness, jaundice	Areas known to produce toxic grain should be withdrawn from cultivation of food plants

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7. Shellfish poisoning	A thermostable alkaloid contained in plankton (*Gonyaulax*) consumed by shellfish	Mussels and clams (especially during certain seasons of the year)	5 to 30 minutes or longer	Respiratory paralysis; milder symptoms consist of trembling lips to complete loss of power in muscles of extremities and neck	Control harvesting of shellfish from toxic areas; avoid clams or mussels of unknown quality
8. Snakeroot poisoning	Tremetol from snakeroot (*Eupatorium urticaefolium*)	Milk from cows pastured on snakeroot	Variable period; after repeated use of milk from cows pastured in an area in which snakeroot is present	Weakness or prostration; vomiting; severe constipation; stomach pain	Prevent milk cows from grazing in pastures where snakeroot is present
9. Solanine poisoning	*Solanum tuberosum*	Green or sunburned potatoes, wild celery	Few hours	Vomiting, diarrhea, headache, abdominal pains, prostration	Do not use sprouts or peel of green potatoes, sunburned potatoes, or wild celery
10. Water hemlock poisoning	Cicutoxin or resin from water hemlock (*Cicuta maculata*)	Leaves and root of water hemlock	1-2 hours	Nausea, vomiting, convulsions	Do not eat any part of the water hemlock plant

F. PHYSICAL

Illness	Causative Agent	Foods usually involved	Incubation period	Signs and Symptoms	Measures to prevent spread by food
Radiation poisoning	Ionizing radiations	Any food exposed to contamination from radioactive materials	Variable over lifetime, depending on degree and type of contamination	Excessive radioactivity of body discharges; variable signs and symptoms depending upon dosage and parts of body exposed	Remove source of exposure; monitor foods suspected of being contaminated and destroy contaminated foods

Carbon monoxide: While carbon monoxide poisoning is not attributable to food, it sometimes causes illness that may be confused with food intoxication. This should be considered when illnesses suspected of being foodborne are investigated.

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